

Moose Wildlife Habitat Decision Aid

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Introduction

In British Columbia, specific amounts of habitats critical for the winter survival of moose (*Alces alces*) are maintained under the Forest Planning and Practices Regulation (FPPR) and protected under the Government Actions Regulation (GAR). Key habitat elements, such as mineral licks and significant wallows, can be protected as a practice requirement under the FPPR as “Wildlife Habitat Features.” Other seasonal habitat elements, such as buffers on wetlands and riparian reserve areas, receive limited protection under these statutes and are protected to varying degrees across the range of the species. A number of land use plans have made recommendations for maintenance of moose habitat. A complete list of these plans can be found at: <http://ilmb.gov.bc.ca/category/products-and-services/plans>.

The Wildlife Habitat Decision Aid (WHDA) format has been used to convey information on factors requiring consideration when managing forests and range in British Columbia for specific wildlife species. This WHDA summarizes important seasonal habitat elements and provides information for land and resource managers to consider when addressing the seasonal habitat requirements for moose in managed forest areas. Also included is a valuable resource and reference list that contains more detailed information. Most reference material that is not available online can be ordered through libraries.

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Moose – British Columbia's Interior



Jared Hobbs

Distribution

Moose are found across the interior of British Columbia at varying densities. On the coast, moose are only found at the head of a few large inlets including Knight Inlet, Observation Inlet, and Douglas Channel.

Biogeoclimatic subzones^a where moose are the most commonly found (but are not restricted to)^b.

IDFdm	ICHmw	SBSdh
IDFdk	ICHwk	SBSvk
IDFmw	ICHxw	SBSdk
MSxk	ICHmk	SBSmc
MSdc	ICHdw	SBPSmc
MSdk	ESSFdk	SBPSdc
MSdm	ESSFmw	SBPSmk

Important habitat features of moose winter ranges

Important habitat features are segregated by administrative boundaries. Nevertheless, ecological similarities exist within each of the forest regions.

Northern (Northern Interior Forest Region)

- Moose require a mix of forest age classes.
 - 20–30% of area in snow interception cover (stand age > 60 years old; canopy closure 40–65% or greater). In areas of higher snowfall (i.e., the Interior–Cedar Hemlock and Coastal Western Hemlock zones, and the wetter portions of the Sub-Boreal Spruce), consider providing the higher range of snow interception cover.
 - Locate snow interception cover around key habitat features where snow depths are critical, such as wetlands, major riparian corridors, and valley bottoms. Snow depths exceeding 90 cm are considered limiting to moose.
- Thermal cover is required for relief from warmer daytime temperatures as well as extreme winter temperatures found in the northern part of the range.
 - Stand composition of more than 60% conifers (preferably Douglas-fir or spruce species) that are greater than 10 m in height, with more than 40% canopy closure in patches greater than four tree lengths in width to maintain microclimate conditions.
- Moose winter ranges are generally located on sites below 1000 m, with aspects ranging between 110° and 250° and slopes of less than 40%.

^a See Meidinger and Pojar (1991) for an explanation of Biogeoclimatic Ecosystem Classification (BEC) zone, subzone, and variant abbreviations.

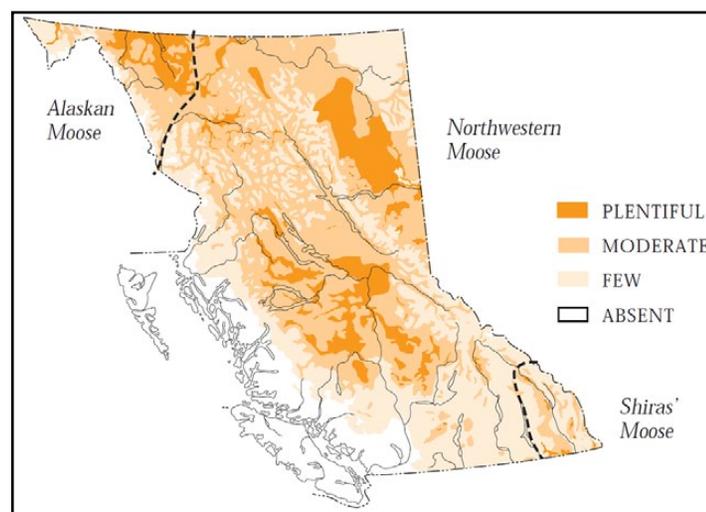
^b Very rarely found in coastal biogeoclimatic zones.

- Locate thermal cover around key habitat features where snow depths are critical, such as wetlands, major riparian corridors, and valley bottoms.

Southern (Southern Interior Forest Region)

- Moose require a mix of forest age classes.
 - 20–30% of area in snow interception cover (stand age > 60 year; canopy closure > 40%). For moose winter ranges located in the Interior Cedar–Hemlock zone, consider providing higher canopy closure.
 - Locate snow interception cover around key habitat features where snow depths are critical, such as wetlands, major riparian corridors, and valley bottoms.
- Thermal cover is required for relief from the warmer daytime temperatures found in the southern portion of the range.
 - When designing snow interception cover, incorporate nodes of interior forest to ensure thermal cover is maintained. This could include forests of younger age with higher canopy closure (e.g., forests > 40 years old, with > 40% canopy closure in patches greater than four tree lengths in width to maintain microclimate conditions).

Moose distribution in British Columbia



Distribution of moose in British Columbia, showing approximate ranges of three subspecies. Map from B.C. Ministry of Environment, Lands and Parks, 2000.

Other important habitat features

Northern and Southern Regions

- Mineral licks and wallows are important habitat elements to consider during the planning of forest activities.
 - Mineral licks are generally used by multiple ungulate species and are an important feature on the landscape.
 - Wallows are more common features on the landscape and are significant features during the rutting season.
- Wetland complexes are also important habitat elements to consider during planning activities.
 - Wetland complexes are used by moose during all seasons for foraging.
 - When planning forest activities adjacent to wetland complexes, considerations should be given to maintaining thermal and security cover adjacent to these features.
 - Lakes and ponds are used by moose in the spring and summer months when foraging occurs on both submergent and emergent vegetation.
 - When planning forest activities adjacent to lakes and ponds, consider maintaining both security and thermal cover.

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Northern and Southern Regions (continued)

- During favourable conditions, forage habitats consist of deciduous-dominated stands and early seral vegetation.
 - Key forage areas are generally located in moist areas, floodplains, and early seral shrublands. Because the distribution of early seral vegetation depends on periodic or stochastic disturbances, foraging areas may also include regenerating burns, cutblocks, and avalanche chutes.

Diet

Winter

In winter, moose are browsers, accessing twigs and new growth up to 2.5 m in height. Where range conditions are poor or declining, moose may push and snap taller-growing trees such as trembling aspen to access current growth, which is not generally available.

- Browse species include *Abies* spp., birch (*Betula* spp.), cottonwood (*Populus deltoides*), red-osier dogwood (*Cornus stolonifera*), falsebox (*Paxistima myrsinites*), highbush-cranberry (*Viburnum edule*), mountain-ash (*Sorbus* spp.), *Ribes* spp., Saskatoon (*Amelanchier alnifolia*), trembling aspen (*Populus tremuloides*), western redcedar (*Thuja plicata*), wild rose (*Rosa* spp.), and willow (*Salix* spp.).

Summer

In summer, moose are browsers, but the diet also includes succulent food items such as some terrestrial plants and aquatic vegetation.

- Succulent forage species include *Carex* spp., fireweed (*Epilobium angustifolium*), pondweed (*Potamogeton* spp.), yellow pond-lily (*Nuphar* spp.), and the new growth of browse species.

Harvesting risks and considerations

When conducting harvesting activities in designated moose areas, consider the following habitat management strategies.

Seral stage

- Moose require ready access to all seral stages (from early seral to old) to meet life requisites. When planning harvest activities within moose winter range, maintain mosaics of both early and older seral stages over a harvest rotation and across the landscape.
- Design harvest patterns that will produce irregularly shaped cuts with scattered shelter patches to mimic natural disturbances patterns and to provide a balance of forage, snow interception, thermal, and security cover.
- When looking at maintaining old seral, consider co-locating with other land-base removals such as riparian

areas. Such land-base removals may need to be enlarged to provide adequate thermal and snow interception cover.

- To produce a continuous supply of preferred browse species, use silviculture systems such as clearcutting, variable retention (group retention), selective logging, and commercial thinning.

Thermal and snow interception cover

- Thermal cover should be dispersed across the summer and winter habitats in patches large enough to provide some interior forest condition. Locate these patches directly adjacent to key habitat elements, such as wetlands, lakes, riparian areas, mineral licks, and wallows.
- Snow interception cover should be dispersed across the winter range and located directly adjacent to key winter habitat elements such as wetlands and riparian areas. These patches should be large enough (> 4 tree lengths wide) to ensure snow interception and thermal cover is maintained.
- When planning harvest activities, consider patterns that minimize wind damage and blowdown.

Wetlands and riparian areas

- Wetlands and lakes are key habitat elements across all seasons. When planning harvest activities, consider successive harvest patterns through a complete rotation that will maintain sufficient thermal and security cover for both summer and winter ranges directly adjacent to these key features.

Mineral licks and wallows

- Mineral licks and wallows can be protected using stand-level measures such as wildlife tree patches.
- Consider the location of road, skid trails, and other types of machinery activities. Disruption of drainage patterns and groundwater can damage these features.

Large-scale salvage associated with mountain pine beetle

- Large-scale salvage associated with forest health agents and forest fire can create extensive areas of even-aged stands. Before conducting salvage activities, identify key habitat elements, such as wetlands, significant riparian areas, licks, and wallows.
- Maintain security and thermal cover (based on available timber types) adjacent to these key habitat elements.

Access

- Locate roads away from key habitat elements, such as lakes, wetlands, mineral licks, wallows, and rutting areas.
- In areas of high resource road density, co-ordinate the development of resource roads between user groups.
- Completely rehabilitate and (or) deactivate in-block roads adjacent to key habitat elements immediately after the completion of primary forest activities.

Silviculture risk and considerations

When conducting silviculture activities in designated moose areas consider the following habitat management strategies. Co-ordinate silviculture practices with local mountain caribou management strategies as management objectives may conflict.

Single-tree selection

- Single-tree selection is a less favourable silviculture system to manage moose habitat.
- If this silviculture system is employed within moose winter range, consider maintaining snow interception and thermal cover and enhancing forage production.

Group selection and small clearcut

- Group selection and small clearcut can be used to maintain or enhance forage production adjacent to key habitat elements.
- Design cut leave patterns to maintain snow interception and thermal cover adjacent to key habitat features.
- Plan opening sizes of 1–5 ha and configure openings to accommodate a three-pass system.
- If the objective is to manage forage production, use minimum stocking densities.
- Broadleaf species should be considered acceptable crop species.

Planting and site preparation

- To achieve the highest security, snow, and thermal cover when the stand reaches pole-sapling stage, attempt to meet maximum stocking densities adjacent to key habitat elements such as wetlands. This can occur in large clusters (> 0.50 ha) or across the entire treatment area.
- Consider minimum stocking densities within 100 m of mineral licks and significant rutting sites.
- In areas where forage production is a concern, replant blocks at minimum stocking standards or at variable planting densities (i.e., planted patches with intermittent openings) to delay crown closure and thus produce higher capacity for forage growth. Blocks that are not satisfactorily restocked also meet this objective.
- Plan for conifer-dominated regeneration within 100 m of key habitat elements such as wetlands and major riparian areas. Where possible, regenerating stands should consist of a tree species mixture that provides good snow interception characteristics such as Douglas-fir and spruce.
- Consider mixedwood and broadleaf stands as an acceptable species mix for areas within important winter and summer habitats.

Brushing

- Avoid treating key browse species.
- Encourage growth of browse species adjacent to key habitat elements.

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Brushing (continued)

- Use targeted site preparation techniques to enhance key forage species.
- “Wound” key browse species to allow for release of crop species while maintaining key forage species. This can include lower dosages of pesticides and cutting stems of brush species to encourage “hedging.”
- Protection of crop species from browse damage is extremely difficult and expensive. Very few (if any) methods will effectively protect individual stems from large ungulates. When planting adjacent to key habitat elements, use species that are least susceptible to browsing (e.g., Engelmann and Sitka spruce).

Herbicides

- Do not use broadcast herbicide treatments on high-value forage species such as willow (*Salix* spp.), red-osier dogwood (*Cornus stolonifera*), high-bush cranberry (*Viburnum edule*), and other preferred species.

Spacing and pruning

- Consider juvenile spacing to reduce crop tree density and thereby stimulate browse production on moose wintering grounds.
- Prune to increase light penetration and support forage production longer into the rotation.

Browsing

- Coniferous browsing usually occurs when higher moose densities are found or when preferred deciduous browsing species are depleted.
- Spruce is the only tree species not browsed by moose. If spruce densities increases dramatically on heavily browsed sites, browse production may decline as the canopy becomes closed.
- Allow for the use of broadleaf species as a crop species when determining whether stands are satisfactorily stocked.

Growth and yield implications

- The growth and yield implications of maintaining winter ranges will be minimal because most winter range is managed as forest cover constraints, which should have negligible impacts on the Allowable Annual Cut (AAC).
- Maintaining forage may affect the attainment of maximum stocking densities in harvested areas.
- Maintaining enhanced buffers (beyond the FPPR requirement) adjacent to wetlands and major riparian areas may result in further AAC impacts.

- Protecting mineral licks and wallows may have additional AAC impacts beyond wildlife tree patch targets based on FPPR legislative requirement of “do not damage or not render ineffective.” The degree of impact will be based on the occurrence of these features across a timber supply area or tree farm licence; however, it is likely that any AAC impacts will be negligible.
- The Chief Forester has provided direction for the incorporation of mixedwood and broadleaves into stocking standards and timber supply review regeneration assumptions. Changes in stand composition will be incorporated into current and future timber supply reviews.

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Test Your Knowledge . . .

British Columbia's Interior: Moose Wildlife Habitat Decision Aid

How well can you recall some of the main messages in the preceding Extension Note?

Test your knowledge by answering the following questions. Answers are at the bottom of the page.

1. In which part of British Columbia are moose found?
 - A) Northern Interior
 - B) In most biogeoclimatic zones across the province including the Coastal Western Hemlock Zone
 - C) Southern Interior
2. When is thermal cover important?
 - A) Winter
 - B) Summer
 - C) Winter and summer
3. What is the critical snow depth for moose?
 - A) 90 cm
 - B) 50 cm
 - C) 120 cm

ANSWERS

1. B 2. C 3. A